D-15830

CALIFORNIUM FISSION FRAGMENT (^{252}Cf) TEST CHAMBER: OPERATION PROCEDURE

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Date: 6/17/98

Fred W. Sanders
Fred W. Sanders, Radiation Safety Officer,
Radiation Safety Committee

Date: 6/17/98

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Date: 6/23/98

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1.0 APPROVED OPERATORS

Only operators approved by the JPL Radiation Safety Committee listed below may expose the source. These operators cannot designate others to act in their place. The JPL Radiation Safety Committee must approve any additions to this list, and prospective operators must contact the JPL Radiation Safety Officer (4-2065) to schedule training.

Dr. Charles E. Barnes	4-4467
Larry D. Edmonds	4-2778
Tetsuo F. Miyahira	4-2908
Duc N. Nguyen	4-8554
Gary M. Swift	4-5059

2.0 SCOPE

This work instruction is applicable to the operation and maintenance of the californium-252 heavy ion fission source and associated vacuum system used for single event effects (SEE) testing.

3.0 DEFINITIONS

3.1 None.

4.0 QUALITY RECORDS AND FORMS

4.1 None.

5.0 SAFETY PRECAUTIONS AND WARNING NOTES

5.1 Californium fission fragments have a very limited penetration range. Human skin is an adequate protection against these fragments. The primary hazard from californium is from ingestion, which could occur from consuming foods that have been contaminated with californium fission residue. The best safety precaution against this hazard is to wash your hands after coming in contact with items contaminated with these residues and especially before eating. The sources of fission contamination are from the surface of the californium planchet, parts that have been irradiated with the californium source, and the interior surfaces of the californium chamber.

5.2 A cyclindrical paraffin lined storage container is provided for the californium source. When the source is not in use, it will be placed in its storage container and the storage container placed in the locked cabinet next to the californium chamber. If the californium chamber is to be used within the next twenty-four hours, the source may be left in the chamber with the chamber door closed and latched.

6.0 REFERENCES

6.1 None.

7. 0 EQUIPMENT AND CALIBRATION

7.1 Six BNC connectors and six 40-pin Ainsley connectors are available for making electrical connections from the test board inside the chamber to test equipment outside the chamber.

7.2 Initial source calibration is performed by placing a silicon surface barrier detector (SSBD) at a known distance from the source. The detector output signal is amplified and used as the input to a multichannel analyzer (MCA) that provides a display of the number of particles (fluence) as a function of energy. The flux (particles/second) can be calculated from the fluence and time of measurement. Subsequent determinations of flux and fluence are obtained by calculation of the source decay.

8.0 OPERATING PROCEDURE

8.1 Setup

8.1.1 Position the test device so that it is in line with the californium source.

8.1.2 Adjust the distance from the source to the test device to obtain the correct flux.

8.1.3 Make all required electrical connections from the test board to the test equipment using the BNC and 40-pin connectors provided on the vacuum chamber.

8.2 Startup

8.2.1 Close and latch vacuum chamber door.

8.2.2 Close vent valve located on the rear wall of the vacuum chamber.

8.2.3 Turn on vacuum gauge.

8.2.4 Turn on vacuum pump power switch located on the bottom right of the vacuum pump control panel.

8.2.5 Toggle the momentary start switch to the left to start the pump.

8.2.6 Slowly open gate valve.

8.2.7 Testing can begin when the pressure drops below 10 microns.

8.3 Shutdown

8.3.1 Turn off test equipment.

8.3.2 Close gate valve.

8.3.3 Vent the chamber using the vent valve located on the rear wall of the chamber.

8.3.4 Toggle momentary stop switch to the left to stop the pump.

8.3.5 Turn off vacuum gauge.

8.3.6 Turn off vacuum pump power switch.

9.0 FLOW DIAGRAM

9.1 None.